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PARENT TRAINING AND READING GAINS OF ELEMENTARY SCHOOL CHILDREN.

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A SMALL SAMPLE PILOT PROJECT WHICH DEMONSTRATED A TREATMENT EFFECTIVENESS AND SUGGESTED FUTURE LINES FOR RESEARCH AND DEVELOPMENT OF PARENT TRAINING PROGRAMS IS DESCRIBED. THE MAJOR HYPOTHESIS TESTED WAS THAT PUPILS WHOSE PARENTS WERE INVOLVED IN A TRAINING PROGRAM WOULD SHOW GREATER REGRESSED GAINS IN READING SKILLS THAN PUPILS WITH PARENTS NOT IN TRAINING. IN LATE SPRING, AN INVITATIONAL LETTER WAS SENT TO PARENTS OF CHILDREN WHO WOULD BE IN THE THIRD TO SIXTH GRADES IN TWO ELEMENTARY SCHOOLS AND WHOSE READING ABILITY WAS 1 OR MORE YEARS BELOW GRADE LEVEL. THERE WERE 13 EXPERIMENTALS AND 16 CONTROLS IN THE FINAL GROUP. THE CALIFORNIA READING TEST AND THE GILMORE ORAL READING TEST WERE ADMINISTERED TO THE PUPILS AS THE PRE- AND POST-TESTS. THE EXPERIMENTAL PARENT GROUP WAS TAKEN THROUGH THE PARENT-TRAINING PROGRAM. AFTER THE POST-TESTING OF ALL PUPILS IN READING, THE CONTROL GROUP PARENTS PARTICIPATED IN THE TRAINING PROGRAM. IN READING COMPREHENSION, THE CONTROL GROUP GAINS WERE GREATER THAN EXPERIMENTAL GROUP GAINS. THE PARENT TRAINING PROGRAM ACCOUNTED FOR 16 PERCENT OF VARIANCE IN ORAL READING ACCURACY AND FOR 25 PERCENT OF THE VARIANCE IN ORAL READING COMPREHENSION. TABLES AND SCATTER PLOTS ARE INCLUDED. THE TRAINING PROGRAM IS DESCRIBED IN THE FINAL REPORT. (BK)

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Parent Training and Reading Gains of Elementary School Children*

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This study is part of a larger report recently completed under a small contract project. For a review of related research and a comparison laboratory investigation see the final report of the project. The phase of the study reported here was designed simply to evaluate the effectiveness of a parent training program in producing reading gains of children. This study was intended as a preliminary to further investigations which would isolate the controlling variables in the treatment program and determine the amount of dependent variable variance accounted for by components of the training program. It was also intended as an attempt to develop an effective training program based on current knowledge.

Hypotheses. -- The major hypothesis tested was that pupils whose parents were involved in a training program will show greater regressed gains than pupils with parents not in training in : 1) oral reading accuracy 2) oral reading comprehension 3) oral reading rate 4) silent reading vocabulary 5) silent reading comprehension 6) total silent reading.

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During the week prior to the beginning of the experimental group training program, the mothers (fathers were also encouraged to attend) of the combined experimental and control students were assembled and told, in general terms, about the project. They were informed that all would be in a training program but in order to keep the size down some would participate in the fall and winter and others in the winter and spring. Positive results of previous programs were presented.

The training program is described in detail in the final report of the project. Each session with parents whether individually or in a group contained seven major objectives which are briefly listed here:

1. Encourage parent goal setting of specific things to accomplish with respect to themselves and their children.
2. Relate new concepts to their own background of experience with as many common associations as possible.
3. Provide knowledge of their own progress and progress of their children at home and school.
4. Offer personal warmth and support to parents.
5. Establish identification of parents with a new reference group "acquainted with some special terminology, successful in specific skills, in a winning operation, etc."
6. Develop skills in behavioral analysis and management through discussion of their own cases and selected training cases and role playing.
7. Develop awareness of own behavior so they can see how competing habits of their own are being reinforced.

Sample. -- In late spring all children who would be in grades three to six the following year in two elementary schools were tested and those with reading ability a year or more below grade level were selected out. An "Invitational Letter" was sent to all parents of children so identified. There was approximately a 50 per cent return which amounted to a sample of 45. Since we could only enroll 20 students in each school in remedial classes, 40 students were invited to the remedial class on condition that the mother (and if possible father) attend the parent class. Students were then randomly assigned to experimental or control group for the parent treatment. Attrition throughout the period of the experiment reduced the sample to 29. There were 13 experimentals and 16 controls in the final group. Both experimental and control parent groups were taken through a parent-training program. The experimental groups participated first. After post-testing of all pupils in reading (the end of the experiment), control group parents participated in the training program.

Means and standard deviations for the experimental and control groups on the instruments used in the study are presented in Tables 1, 2 and 3. Although the means of the I.Q.'s for the control and experimental groups are different, a t test analysis applying Welch's correction for degrees of freedom (Winer, B. J. Statistical Principles in Experimental Design, New York: McGraw-Hill, 1962, p. 37) disclosed that the differences are not significant at the .05 level.

Pupil Measures

The students were tested during the week of September 10, 1965, before the remedial reading program or the parent treatment group had

begun. During this pre-testing each student was administered the California Reading Test, Elementary Level, Form X, on a measure of silent reading achievement. The Gilmore Oral Reading Test, Form A, was also administered at this time to obtain a measure of oral reading achievement. The California Short Form Test of Mental Maturity was administered as a group measure of intelligence.

During the week of January 28, 1966, following the remedial treatment, the students were tested to obtain post-test measures. At this time the California Reading Test, Elementary, Form W, was administered to them as well as the Gilmore Oral Reading Test, Form B.

Design. -- A simple pre-test-post-test control group design was utilized. Children in two elementary schools in grades 3 to 6 who had reading disability and whose parents volunteered to participate in a parent training group while their children were enrolled in a remedial class in school formed the population for the study. The remedial classes met pupils in groups of two to five students and the treatment was the same for both experimentals and controls.

The first analysis consisted of getting the correlations between the pre- and post-test scores of the students on the California Reading Test and the Gilmore Oral Reading Test. In this analysis the students in the experimental and control groups were combined into one group for the pre-test and one group for the post-test. This correlational analysis was done for two reasons. It enabled us to study the data in correlational manner for each sub-test. Secondly, the analysis gave us a basis for predicting post-test scores for each student in the sample, based upon his pre-test score on an alternative form of the same test.

A chief focus of this study was the pupil gains in the areas of silent (California) and oral (Gilmore) reading. It was decided that simple pre-test vs. post-test gain scores would be less desirable than a difference score taken as a difference between end of treatment predicted score and actual end of treatment score. Thus, in each of the sub-tests for silent and oral reading, regression equations were obtained using as the predictor variables the pre-test scores of the sub-test. Using this method, a post-test score was predicted for each subject on each of the silent and oral subtests. This score was then subtracted from the actual score giving us a regressed gain score for each subject. The experimental and control group regressed gain scores for each sub-test were then compared by means of the t technique.

Analysis of Pre-Test and Post-Test Correlations

In the examination of the pre/post- correlations two things are of interest; first, the magnitude of the correlation, secondly the scatter plot of scores showing the relationship of individual scores in relation to the regression line.

The correlations between the pre- and post- administration of the California Reading Test and the Gilmore Oral Reading Test are shown in Table 4. The correlations for the California Reading Test are all of high positive magnitude.

An examination of the scatter plots for each correlation was also included. The point of interest to us in this examination was to see the position of the experimental and control scores with the regression line.

The scatter plot of the Reading Vocabulary subtest of the California Reading Test shows that the scores are quite evenly distributed in relation to the regression line. In the experimental group four scores are above the line, two on the line and seven below the line. In the control group four scores are above the line, five on the line, and seven below the line. Thus, the predictions as to post-test performance are about evenly distributed between experimental and control groups.

The scatter plot for the Reading Comprehension subtest of the California Reading Test shows the same relationship for the experimental groups as was found in the Reading Vocabulary: four scores above the regression line, two on the line and seven below the line. Control group scores placed seven above the line, two on the line, and seven below the line. Again this shows us that our predictions would be about evenly spaced, some over predictions and some under predictions. The tendency would be to slightly over-predict post-test scores for the experimental group. The tendency would be to conclude that the treatment has slightly less effect on the Reading Comprehension (silent) than might have been expected.

The scatter plot for the Total Reading shows that for both the experimental and control groups the scores tend to cluster very closely to the regression line. There would perhaps be a slight tendency to under-predict scores for both the experimental and control groups on the post-test Total Reading score. Thus, we might conclude that the treatment has been slightly more effective than we might have expected, as reflected in the students' Total Reading score.

The scatter plot of scores for the Gilmore Accuracy score are of interest. Eleven of the 13 experimental student scores fell above the regression line and two were below the line. Thus, we would tend to under predict post-test accuracy scores for the experimental group, meaning that the treatment had a positive effect on the experimental group, increasing their post-test Accuracy scores to a greater extent than we might have predicted on the basis of pre-test-post-test correlations for the total sample of experimentals and controls together. The scores for the control students, however, show a slight tendency for over prediction indicating that the treatment was slightly less effective for them than we would have predicted. Six student scores are above the regression line and 10 are below the line for the control group.

In examining the scatter plot for the Gilmore Comprehension scores we find a low correlation ($r = .25$) and the expected resulting wide scatter of scores. It is still of interest for us to examine the relationship of the student scores for the experimental and control groups with the regression line. We find that nine of the experimental student scores fell above the regression line, one on the line and three below the line. Our conclusion would be that a predicted post-test score would most likely be less than an individual's obtained post-test score. The treatment was apparently more effective for the experimental students than we might have predicted. The control student's scores show a different picture. Three of the control scores are above the regression line and 13 below the line. Thus, we would conclude that the treatment appears to have had less effect upon raising the control student post-test scores than the experimental student scores.

The scatter plot for the Gilmore Rate shows that seven of the experimental student post-test scores fell above the regression line, three on the line and three below the line. This would indicate slightly better than predicted post-test scores for about half of the experimental group. In other words, the treatment was apparently successful in producing higher post-test scores for half of this group. Four student scores for the control group fell above the regression line, one on the line, and eleven below the line. This would lead us to conclude that the treatment was less effective for the control group on oral Rate than might have been predicted or in comparison to the control group.

Analysis of Regressed Gain Scores

Regressed gain scores were computed for each student on each of the test subscores. These regressed gain scores served as the measure of gain as a result of the treatment and were compared for the experimental vs. control students on each subscore by means of the *t* technique and for the per cent of variance accounted for by the treatment by means of W^2.

The *t* analysis and W^2 for the experimental and control on the California Reading Test results are as follows:

	t	Significance	W^2
Reading Vocabulary	-.04	n.s.	.00
Reading Comprehension	--1.81	p>.10	.10
Total Reading	1.41	n.s.	.05

The difference between the regressed gain scores for the experimental and control groups in the Reading Vocabulary and Total Reading

scores on the California Reading Test are not significant. The difference between the regressed gain scores for the experimental and control groups on the Reading Comprehension score is significant at the .10 level. The t (-1.81) also tells the direction of the significance, in this case, that the control group regressed gains are significantly greater than the experimental group on the Reading Comprehension (silent) subtest.

The t analysis and W^2 for the experimental and control groups on the Gilmore Oral Reading Test are as follows:

	t	Significance	W^2
Accuracy	2.16	p>.05	.16
Comprehension	2.76	p>.02	.25
Rate	1.95	p>.10	.12

The differences between the regressed gain scores for the experimental and control groups on the Gilmore Oral Reading Test subscores are all significant. The results indicate that the experimental group scores are significantly greater than the control group scores. The level of significance for each of the subtests is different.

The results of the t analysis of the regressed gain scores for the experimental and control groups would enable us to conclude the following:

1. The treatment program apparently had little effect on the gains of the Reading Vocabulary and Total Reading subscores of the California Reading Test (silent reading).

2. There was a significant difference (.10 level) between the experimental and control groups on the California Reading subtest, Read-

ing Comprehension; however, this difference indicated control group gains to be greater than experimental group gains.

3. The treatment program apparently had a significant positive effect on the three subscores of the Gilmore Oral Reading Test. Although the levels of significance are different for each of the three subscores, they are all in the same direction in this analysis indicating experimental group gains were greater than control group gains.

4. Apparently the treatment program was more effective in increasing oral reading gains than silent reading gains.

The $\underline{W^2}$ column in the two tables above tell us the percent of variance on the respective reading achievement measures accounted for by the experimental treatments. The formula used $\left(\frac{t^2 - 1}{t^2 + N_1 + N_2 - 1}\right)$ is from Hays, W. L., Statistics for Psychologists, Holt, Rinehart and Winston, 1965, pp. 327-328. Both oral reading accuracy and comprehension measures reflect significant treatment differences favoring the experimental group and a substantial amount of variance is accounted for by the treatment. Silent reading measures reflect only one significant treatment difference and that favoring the control group but a rather low degree of association between the treatment and the dependent variables. In summary, we have found the experimental treatment (parent training) to have an impressive effect on oral reading gains, making a follow-up of this finding a promising venture.

Future Research and Development.

The study reported here is a small sample pilot project which has demonstrated a treatment effectiveness and suggested future lines for research and development of parent training programs.

One line of research that follows from the study just completed is the identification of the amount of variance in dependent variable measures accounted for by specific parts of the treatment program. The parent training program accounted for 16 percent of the variance in oral reading accuracy and 25 percent of the variance in oral reading comprehension. It might well be that a more limited treatment could account for as much variance. Or, if we could find out what part of the treatment accounts for most of the variance that part might be made even more effective. Or alternatively treatment parameters not accounting for dependent variable variance may be studied to determine whether revisions in the treatment might make it more productive.

Specific problems in implementing the treatment program have been identified. Some of these suggest modifications in the training program. Thus, we found ourselves moving further away from technical jargon as we became involved with parents who had little formal schooling or little interest in our jargon. Also, we found that when we introduced sessions in which they looked at a profile and description of their own children's performance in reading, we had more attentiveness and more follow through on treatment suggestions. Thus, we would put specific case data on their children earlier in our next parent program. Many parents were in such conflict with each other or were so busy with two jobs, children, etc. that they could not manage much time on the program. Others, who could have arranged more time, were according to their own reports "too busy," "sick," or "will be there next time." We found ways eventually of getting to many of these parents,

but our inexperience caught us unprepared to cope early with the problem. Thus, we would make a major part of our next training program the identification of the reluctant and implementation of ways of getting them out to our sessions and following through on recommendations. Two of the most difficult problems faced by most parents on implementing contingency management were: Identifying events that were reinforcing and trying out new behavior patterns inconsistent with their current behavior. One of the contributions of our study was the preliminary development of procedures for helping parents to identify reinforcers using the work of Premack and Ligon as our guides. Another contribution was the preliminary development of special procedures for helping a parent to break a habit interfering with her trying out of a new behavior pattern. These two training innovations will be further developed for future training programs.

Other future developments should include emphasis on father participation or (in the case of father absence) some significant other adult, and development of measures of more specific behaviors related to the training program.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR THE SEPTEMBER AND JANUARY TESTING IN ORAL READING (GILMORE ORAL READING TEST), CONTROL AND EXPERIMENTAL GROUPS

Control Group	September Testing Mean	Standard Deviation
Accuracy	3.0	1.0
Comorehension	3.3	1.2
Rate	85.9	38.2
	January Testing	
Accuracy	4.0	1.1
Comprehension	4.5	1.3
Rate	83.5	24.1

Experimental Group	September Testing Mean	Standard Deviation
Accuracy	2.6	0.6
Comprehension	2.7	0.9
Rate	70.3	24.1
	January Testing	
Accuracy	4.2	0.7
Comprehension	4.8	1.4
Rate	91.1	18.5

TABLE 2

MEANS AND STANDARD DEVIATIONS FOR THE SEPTEMBER AND JANUARY TESTING IN SILENT READING (CALIFORNIA READING TEST), CONTROL AND EXPERIMENTAL GROUPS

Control Group	September Testing Mean	Standard Deviation
Vocabulary	3.9	1.3
Comprehension	3.5	1.1
Total Reading	3.7	1.2
	January Testing	
Vocabulary	4.4	1.5
Comprehension	4.4	1.3
Total Reading	4.5	1.3

Experimental Group	September Testing Mean	Standard Deviation
Vocabulary	2.9	1.0
Comprehension	2.5	0.5
Total Reading	2.7	0.7
	January Testing	
Vocabulary	3.4	1.2
Comprehension	3.4	1.0
Total Reading	3.5	1.1

TABLE 3

MEANS AND STANDARD DEVIATIONS FOR THE
CALIFORNIA TEST OF MENTAL MATURITY,
CONTROL AND EXPERIMENTAL GROUPS

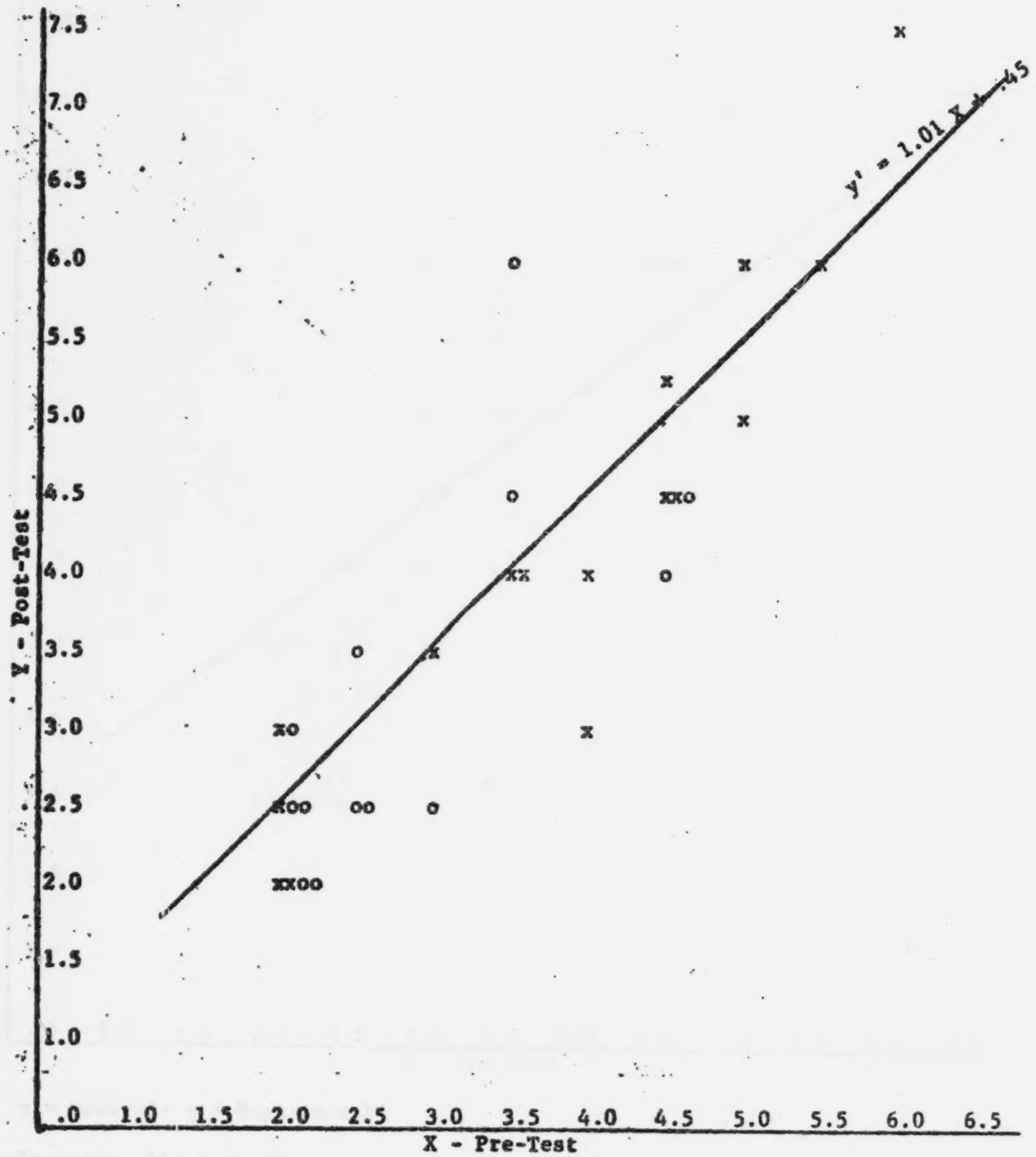
Control Group: N = 16	Mean	Standard Deviation
Language I.Q.	80.7	7.8
Non-Language I.Q.	91.9	8.1
Total I.Q.	84.4	6.8
Experimental Group: N = 13	**Mean**	**Standard Deviation**
Language I.Q.	86.6	6.2
Non-Language I.Q.	99.5	11.5
Total I.Q.	91.5	8.2

TABLE 4

CORRELATION BETWEEN SEPTEMBER AND JANUARY SCORES OF
ALTERNATE FORMS OF CALIFORNIA READING TEST AND
GILMORE ORAL READING TEST (N = 29)

Test	r
California Reading Test	
Reading Vocabulary	.89
Reading Comprehension	.88
Total Reading	.91
Gilmore Oral Reading Test	
Accuracy	.72
Comprehension	.25
Rate	.67

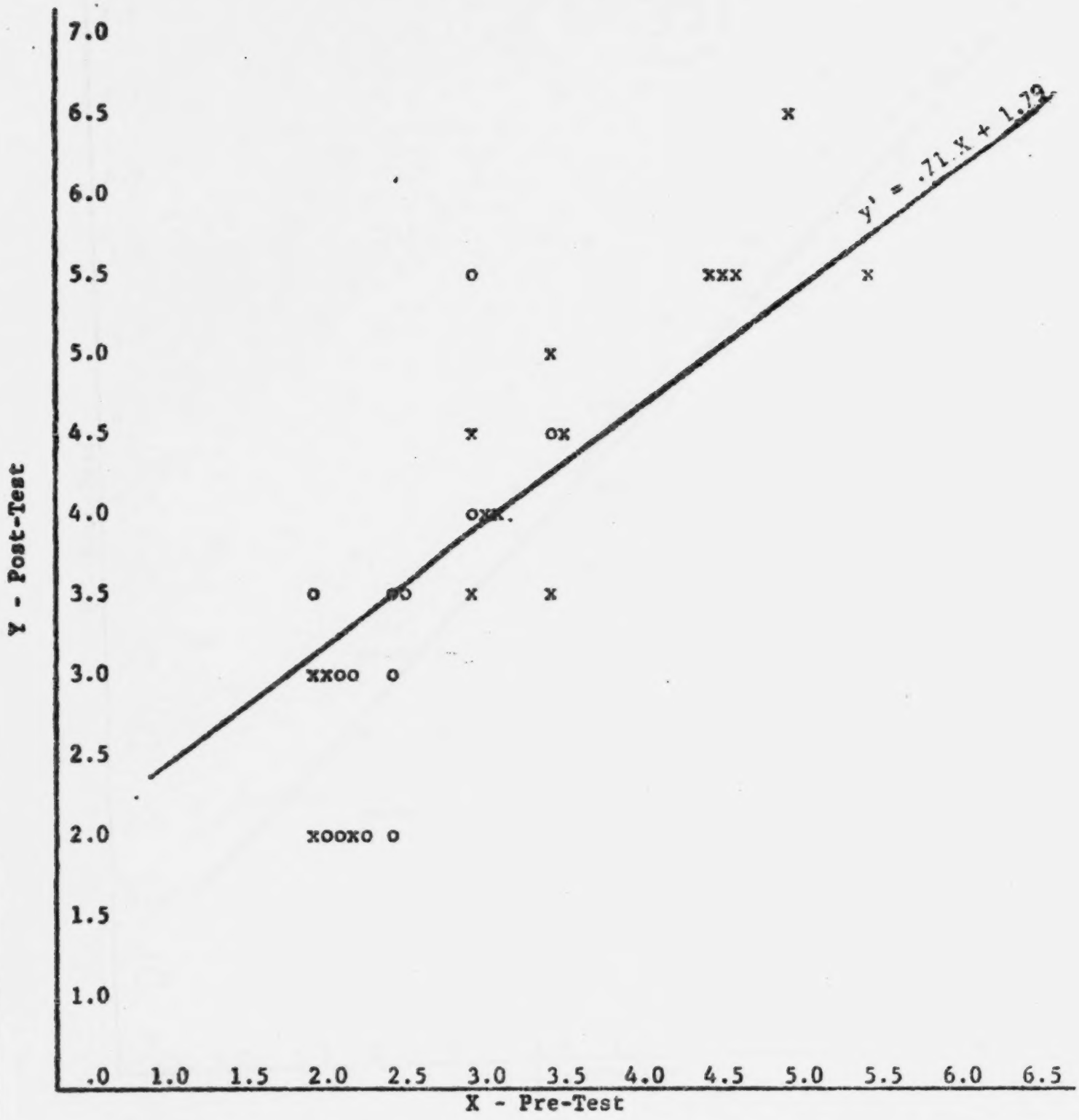
CALIFORNIA READING--VOCABULARY



x = Control; o = Experimental

Sy · x = .66; r = .89

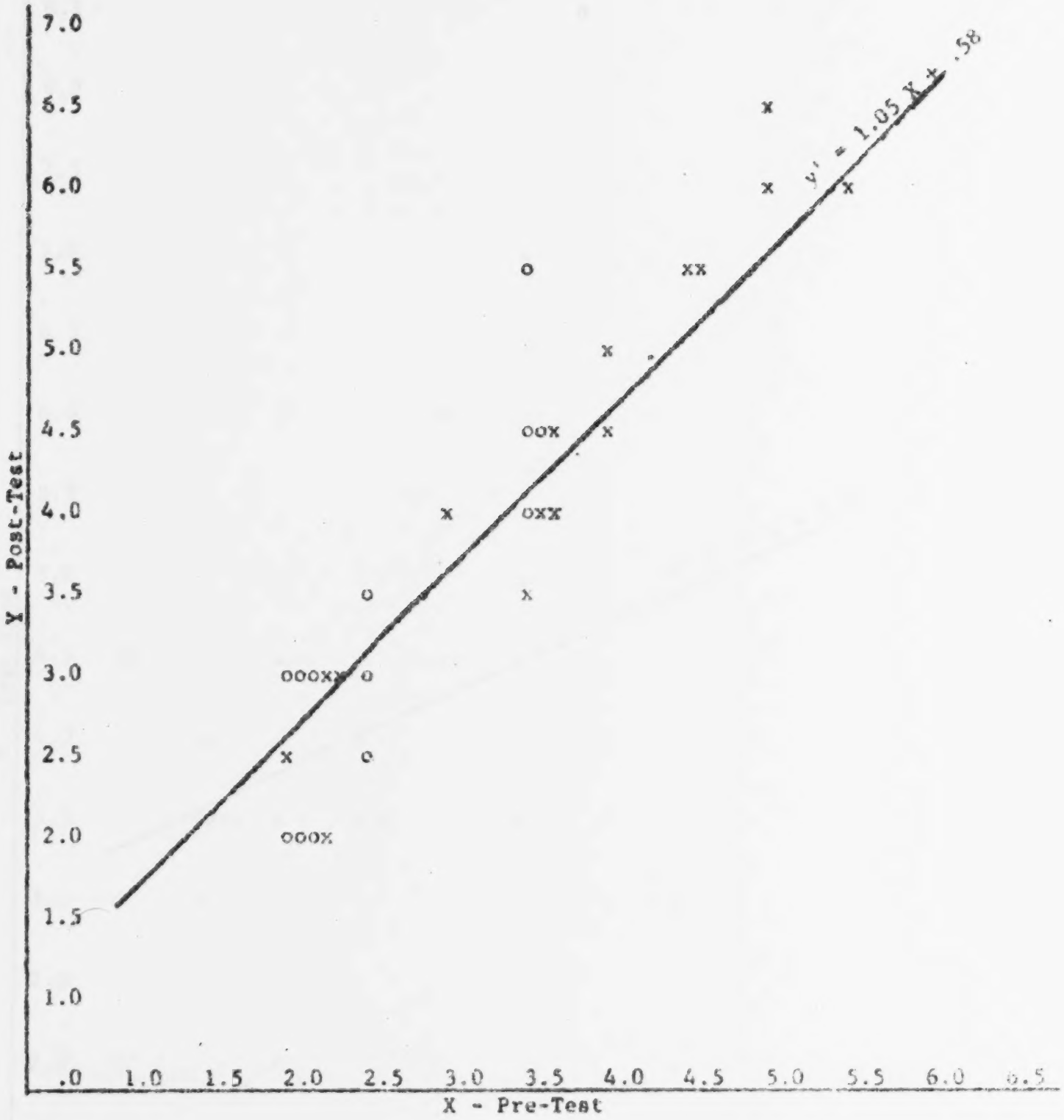
CALIFORNIA READING--COMPREHENSION



x = Control; o = Experimental

Xy · x = .61; r = .88

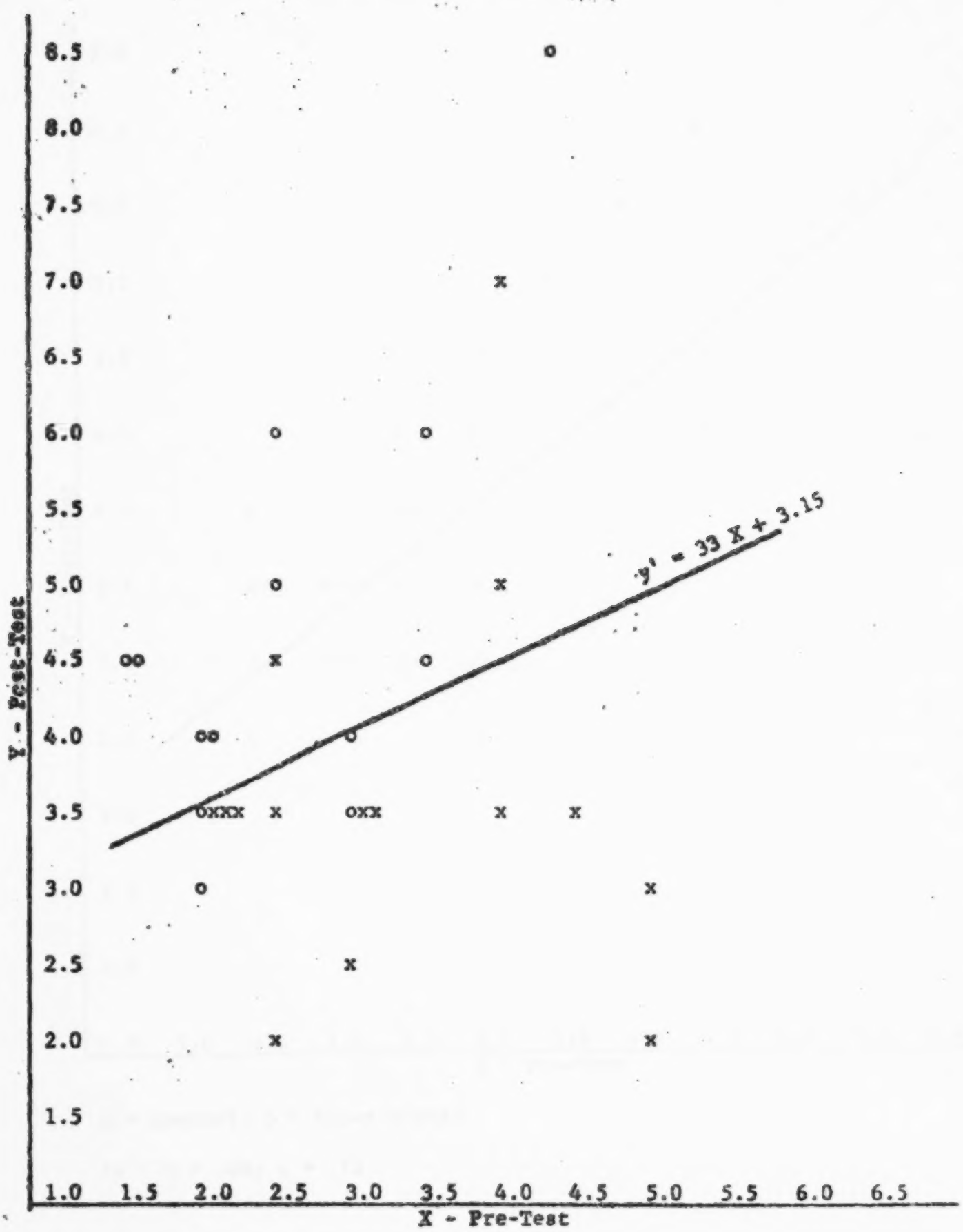
CALIFORNIA READING--TOTAL



x = Control; o = Experimental

$S_{y \cdot x}$ = .54; r = .91

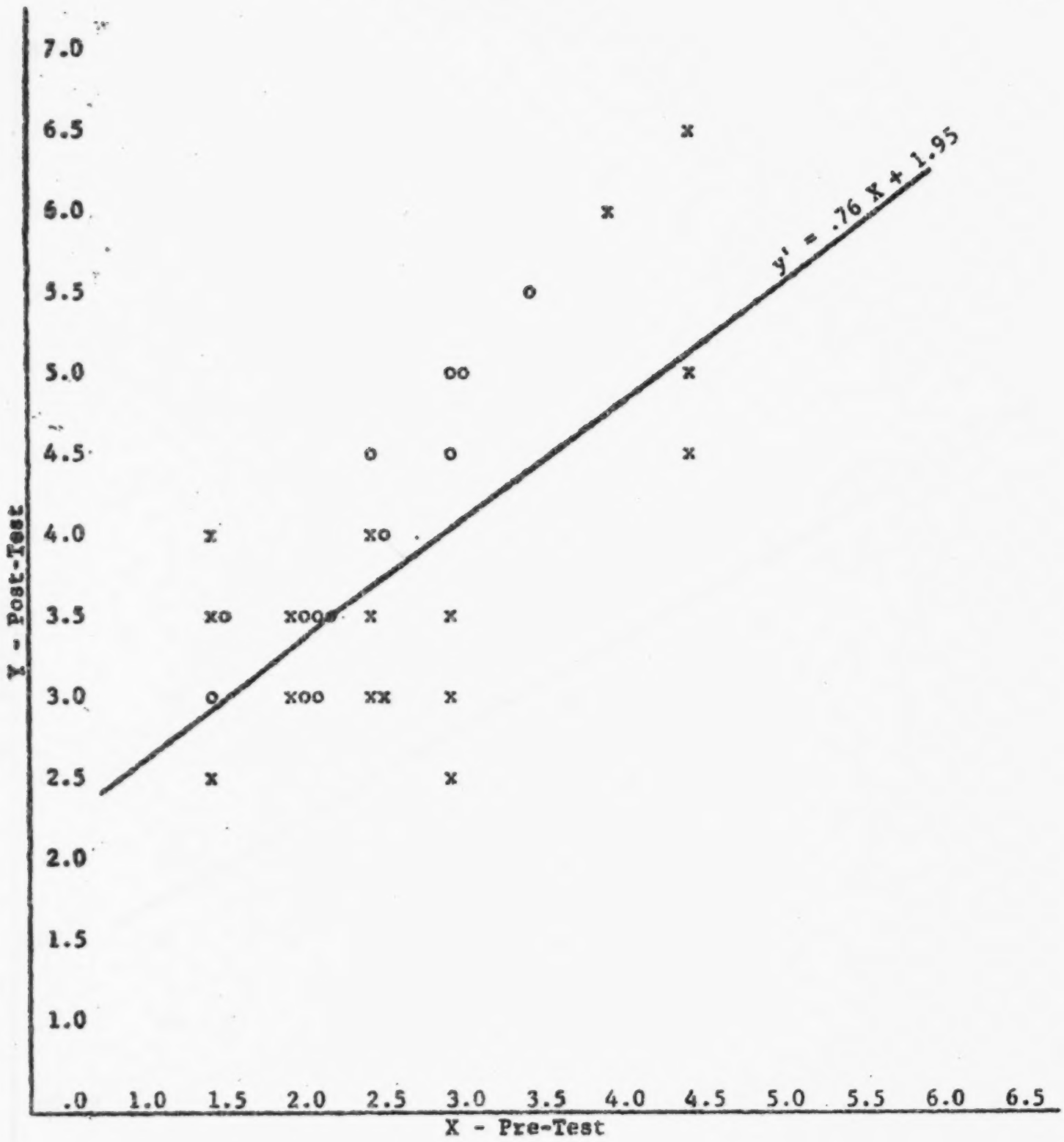
GILMORE--COMPREHENSION



x = Control; o = Experimental

$S_{y \cdot x} = 1.43$; r = .25

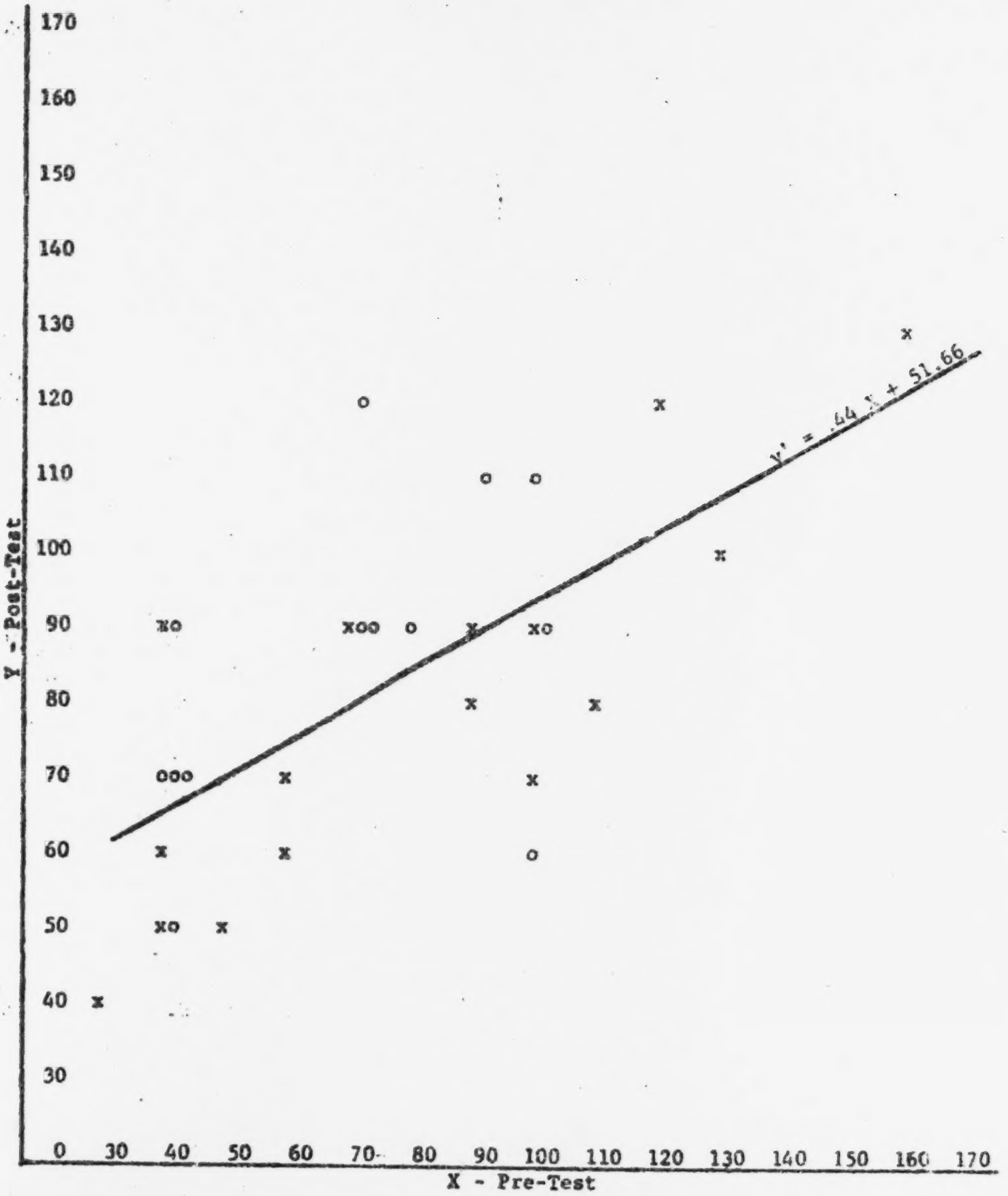
GILMORE--ACCURACY



x = Control; o = Experimental

Sy · x = .66; r = .72

GILMORE--RATE



x = Control; o = Experimental

$S_{y \cdot x}$ = 16.35; r = .67